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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,474

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EXAMINER

OSTERHOUT, BENJAMIN LEE

ART UNIT

PAPER NUMBER

1711

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/591,474	<b>Applicant(s)</b> KANNO ET AL.	
	<b>Examiner</b> BENJAMIN OSTERHOUT	<b>Art Unit</b> 1711	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 5-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 5-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 21 May 2010 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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4. Claims 1-2 and 5-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 20030079764 to Hirose et al. (Hirose) in view of Japanese Patent Application Publication No. JP 2001252604 to Tateyama.

Regarding claims 1 and 13, Hirose teaches a substrate processing apparatus for cleaning a semiconductor (paragraph 2, ll. 1-3) wherein a two fluid nozzle (Fig. 7, generally, paragraph 47, ll. 1-2) mixes a gas and liquid comprising: a nitrogen gas supply passage (Fig. 7, part 28), a liquid passage for supplying deionized water (Fig. 7, part 27), and an ejection passage formed in a straight shape (lead-out passage, Fig. 7, part 45a) to eject a mixture fluid (paragraph 78, ll. 7-13); wherein the ejection passage has an opening (port) is formed at the front end of the ejection passage (Fig. 7, near parts 45 and 45a); wherein the cross-sectional area of the ejection of the exit of the nitrogen gas supply passage is smaller than the cross-sectional area of the ejection passage (Fig. 7, near converging arrows and 45a). Hirose teaches an ejection port with a cross-sectional area equal to the ejection passage. Hirose does not teach that the cross-sectional area of the ejection port is smaller than a cross-sectional area of the ejection passage and that the cross-sectional area of said ejection passage (injection port) is formed constant from an entrance thereof to an exit thereof; or wherein the cross-sectional area of said supply passage is formed equal to the cross-sectional area of the injection port or smaller than the cross-sectional area of the ejection port.

Tateyama teaches a substrate processing apparatus (paragraph 1, ll. 1-3) wherein the nozzle (Fig. 5, part 60) has a discharge opening (Fig. 5, part 63) that has a cross-sectional area smaller than a cross section area of the passage leading up to the

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opening (Fig. 5, parts 60 and 63) in order to apply liquid cleaning solution and clean the substrate (paragraph 1, ll. 1-3).

Since Hirose and Tateyama both teach substrate processing apparatuses with liquid nozzles, it would have been obvious to substitute the nozzle of Hirose with the nozzle of Tateyama with an opening that has a smaller cross-sectional area than the passage leading up to the opening in order to achieve the predictable result of applying cleaning liquid to a substrate and cleaning said substrate.

Hirose in view of Tateyama does not teach that the cross-sectional area of said ejection passage (injection port) is formed constant from an entrance thereof to an exit thereof; or wherein the cross-sectional area of said supply passage is formed equal to the cross-sectional area of the injection port or smaller than the cross-sectional area of the ejection port.

However, this is merely a change in shape wherein the configuration of the claimed injection port or said claimed supply passage is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed injection port was significant in order to achieve the predictable result of delivering a cleaning liquid onto a wafer to be cleaned. See MPEP 2144.04 IV, B. See also *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Furthermore it is obvious to one of ordinary skill that in optimizing the size of the passages (injection port, supply passage, etc.) the atomization of the liquid may improved, thereby leading to a better cleaning effect. However, this is merely optimizing

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the invention. See MPEP 2144.05, Section II, Part B. Furthermore it is clear that the size of the opening will affect the droplet size/diameter and that routine experimentation may be used to discover the optimum droplet size for efficient cleaning

Regarding claim 2, Hirsose in view of Tateyama is relied upon as above in claim 1. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the ejection passage to the ejection port is 1: 0.25 to 0.81, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 2, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 5, Hirsose in view of Tateyama is relied upon as above in claim 13. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the nitrogen gas supply passage is 1.13 mm<sup>2</sup> to 6.16 mm<sup>2</sup>, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 5, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 6, Hirsose in view of Tateyama is relied upon as above in claim 13. While Hirsose in view of Tateyama discloses the claimed invention except for the cross-sectional area range of the nitrogen gas supply passage is 1.77 mm<sup>2</sup> to 4.91 mm<sup>2</sup>, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 6, since it has been held that where the general conditions of

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a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 7, Hirsose in view of Tateyama is relied upon as above in claim 1. Hirose teaches that the ejection passage is formed in a straight shape and that the cross-sectional area of the ejection passage is constant (Fig. 7, part 45a).

Regarding claim 8, Hirsose in view of Tateyama is relied upon as above in claim 7. While discloses the claimed invention except for a length of the ejection passage is 10 mm to 90 mm, it would have been obvious to one skilled in the art at the time of invention to use the claimed range of claim 8, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum workable ranges involves only routine skill in the art (see MPEP 2144.05, Section II, A).

Regarding claim 9, Hirsose in view of Tateyama is relied upon as above in claim 1. While Hirsose in view of Tateyama disclosed the claimed invention except for a length of the ejection port being 30 mm or shorter it would have been obvious to one skilled in the art at the time of invention to use the 30 mm or shorter ejection port, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (see MPEP 2144.05, Section II, Part B).

Regarding claim 10, Hirsose in view of Tateyama is relied upon as above in claim 1. Hirose teaches that a buffer chamber (liquid introduction passage, Fig. 7, part 44a) has an annular shape and surrounds the nitrogen gas supply passage (Fig. 7, part 28) wherein the nitrogen gas supply passage is coaxial with the ejection passage (Fig. 7, parts 28 and 45a); the liquid supply (Fig. 7, part 27) is opened on an outer peripheral

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face of the buffer chamber (Fig. 7, parts 27 and 44a); a taper portion is formed with a diameter which gets smaller toward a front end side in said buffer chamber (Fig. 7, part 44a near where arrows converge); the taper portion opens between the nitrogen gas supply passage and the ejection passage (Fig. 7, where arrows converge); and the gas and liquid mix together wherein one of ordinary skill realizes that cleaning solution droplets will be formed.

Regarding claim 11, Hirose in view of Tateyama is relied upon as above in claim 1. One of ordinary skill in the art realizes that the substitution made in claim 1 and the nozzle of Tateyama will form a vertical cross-sectional shape of an exit side periphery having an acute angle.

Regarding claim 12, Hirose in view of Tateyama is relied upon as above in claim 1. Hirose teaches a spin chuck (Fig. 4, part 71) for holding a substrate horizontal; and a drive mechanism for moving the nozzle comprising a holding arm and guide rail (Fig. 4, parts 77 and 34, respectively).

### ***Examiner's Response to Arguments***

5. Examiner has carefully and thoroughly reviewed Applicant's amendments and arguments in support of patentability, however, Examiner remains unconvinced.

Initially Applicants argue that the cited prior art does not teach the re-atomization of the liquid. However, Examiner finds that it is well known in the art that nozzles may re-atomize liquid and that it is obvious that an optimizing of the nozzle to yield a desired droplet size may lead to a greater cleaning effect. However, this is all routine



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experimentation. Applicant has not identified the single, specific contribution of this current invention over the prior art. Rather, Applicant claims a greater cleaning effect, tailored droplet sizes, etc. All of this points to an optimized invention.

Applicant has not specifically pointed out/directed examiner to see how Applicant has invented something with a new and unexpected result, more so a patentable contribution over the prior art.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN OSTERHOUT whose telephone number is (571)270-7379. The examiner can normally be reached on Monday-Thursday 8:30am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Barr can be reached on (571)272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph L. Perrin/  
Joseph L. Perrin, Ph.D.  
Primary Examiner  
Art Unit 1711

/BLO/

Benjamin L. Osterhout  
16 June 2010